Peter B. Evans
New Power Technologies
25259 La Loma Drive
Los Altos Hills, California 94022

September 5, 2008

California Energy Commission
Dockets Office, MS-4
1516 Ninth Street, First Floor
Sacramento, CA 95814

Re: Docket No. 08-IEP-1G
SGIP Cost Benefit Analysis
Grid Benefits of Self Generation

Perhaps the key element in the Energy Commission's reporting obligation under September 2006's AB 2778 is its going-forward recommendations regarding future Self-Generation Incentive Program (SGIP) eligibility of renewable and conventional-fueled distributed generation in light of their potential costs and benefits. In these comments we would like to encourage the Energy Commission to consider these recommendations in light of the now-demonstrated ability to determine rigorously and objectively the grid benefits of distributed generation or self-generation projects.

Energy Commission-funded research has demonstrated that the grid benefits of individual distributed generation projects vary significantly depending on location, but can be objectively and rigorously determined, without brave approximations. Moreover, potential renewable or conventional-fueled distributed generation projects that could yield extraordinary grid benefits can be identified using methods demonstrated through this research. Future incarnations of the SGIP could use this capability to incent high-value renewable or conventional-fueled distributed generation projects and potentially achieve a high cost-benefit ratio for ratepayer dollars invested.

Background

AB 2778, while eliminating clean combustion resources from the extended SGIP, requires the Energy Commission to evaluate the costs and benefits, including air pollution, efficiency, and transmission and distribution system improvements, of providing ratepayer subsidies for renewable and fossil fuel "ultraclean and low-emission distributed generation," as defined, in part of the Energy Commission's Integrated Energy Policy Report (IEPR). The Energy Commission is also to include recommendations for changes in the eligibility of technologies and fuels under the program, and whether the level of subsidy should be adjusted, after considering its conclusions on costs and benefits. The Governor's signing statement noted the elimination of clean combustion technologies and called for a return of the most efficient and cost-effective technologies to the SGIP program.

The PUC's September, 2005, Preliminary Cost Effectiveness Evaluation Report[1] provided cost-benefit analysis characterized as early results from which parties can begin to shape the future direction of the program. Work led by TIAX, LLC presented at the IEPR workshop on September 3, 2008 includes a methodology considering separately the environmental, macroeconomic, and grid benefits of existing SGIP distributed generation projects. This work is a valuable step towards more detailed, analytically sound evaluation of the costs and benefits of distributed generation under the SGIP. However, in terms of supporting forward-looking recommendations and policy, these results and their methods should still be viewed as preliminary as they do not take full advantage of available data and rely on approximations.

Determination of Grid Benefits of DG – Completed and Ongoing Demonstrations

The Energy Commission, through its Public Interest Energy Research (PIER) Program, has funded demonstrations of a number of advanced methods for assessing the benefits of distributed energy resources (DER) in an integrated systems approach, including a preliminary demonstration of New Power Technologies' Energynet® methodology completed in 2005 [2]and a follow-on demonstration now underway.[3] The key feature of the Energynet methodology is the simulation of the power system in full detail, with all distribution and transmission elements integrated into a single model, to permit the direct observation of the grid impacts of individual distribution-connected DER. The preliminary demonstration was intended to establish the basic feasibility of the approach; the follow-on demonstration was to demonstrate the practicality of this type of high-definition analysis in the large, complex power delivery systems of California's investor-owned utilities.

1. Potential grid benefits of distributed generation projects are broad.

Itron and TIAX/Rumla generally identify grid benefits of distributed generation as including reduced line losses, avoided grid generation, avoided capital upgrades, and reliability benefits. Rumla adds a class of benefits that includes avoided congestion, ancillary services, and CAISO charges. Further, in the case of Itron, "reliability net benefits" are defined as the cost of providing ancillary services for a given load; reliability effects on the grid are counted "in a limited sense," and in the case of Rumla, "local reliability benefits" and "distribution capital deferral savings" are characterized as "difficult" to value.

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[1] Itron, Inc, *CPUC Self-Generation Incentive Program Preliminary Cost-Effectiveness Evaluation Report,* September 14, 2005
[2] New Power Technologies, *Optimal Portfolio Methodology for Assessing Distributed Energy Resources Benefits for the Energynet,* CEC 500-2005-096, March, 2005
[3] PIER Project 500-01-008.

In the 2005 study, New Power Technologies demonstrated the quantification of benefits of distributed generation projects including reduced real line losses in transmission and distribution, avoided or deferred network improvements in both transmission and distribution, and avoided bulk energy and local capacity value. In addition, New Power Technologies demonstrated the quantification of distributed generation project benefits in terms of reduced voltage variability and elimination of high and low-voltage nodes in the network, reduced reactive power flow and consumption, reduced network stress, and increased load-serving capability of the network. The research now underway will demonstrate the quantification of individual distributed generation projects' ability to reduce expected local outage frequency or duration by a) reducing the loading of critically loaded components, b) avoiding substation load drops under a loss-of-transformer bank contingency, and/or c) permitting otherwise-constrained post-contingency load-shifts.

Quantifying this broad set of benefits for individual projects is a necessary first step; a further step is valuing these benefits in dollar terms, particularly considering that a each project likely provides its own mix of grid benefits. New Power Technologies' 2005 study did some work in this area; further work has been done more recently by Navigant Consulting and others. As Rumla points out, the introduction of locational energy values under the California ISO's Market Redesign and Technology Upgrade (MRTU) and locational capacity values under Resource Adequacy will make it easier to transparently value certain elements of grid benefits.

As the Energy Commission considers its recommendations, it should allow for the likelihood that capital deferral benefits of distributed generation, which traditionally receive much attention, may not in the end be the most valuable grid benefits (though they could be for certain projects), that reliability benefits of certain projects may be significant, and that in any case, all of these individual elements can be rigorously quantified, without the need for approximations or suppositions.

2. Grid impacts of distributed generation units are highly localized, and vary significantly from unit to unit.

New Power Technologies showed in the 2005 study using Optimal Technologies' AEMPFAST power system analysis software that the loss and voltage performance of a power system is far more sensitive to the addition of incremental capacity at certain identifiable locations. These findings have been borne out in the follow-on work now underway.

For example, distributed generation at a robust, lightly-loaded location on a circuit may have a modest grid impact, while generation on the same circuit at a more-stressed, electrically remote location, or a at location downstream of a chokepoint, may have a much more marked system impact that could extend well beyond that particular circuit. With reference to reliability, a distributed generation project can have a meaningful impact on reliability only given a confluence of factors *at that location* arising from the power delivery system's design, topology, reserve capacity, and loading under a variety of operating conditions. Again, with the ability to objectively quantify grid benefits of distributed generation, posited differences in grid benefits among distributed generation projects can be rigorously supported.

As the Energy Commission considers its recommendations, it should recognize that generalized assumptions concerning the grid impacts of distributed generation may result in subsidizing low-value projects and are unnecessary.

3. High-value distributed generation projects can be objectively identified prospectively to support targeted incentives.

New Power Technologies' 2005 study identified, using AEMPFAST, a portfolio of prospective DER projects (demand response and distributed generation) chosen for their demonstrated benefits to grid performance. The follow-on research now underway will identify a similar portfolio; however, given a more complex, more heavily-loaded system, this study will also show that projects at a very small number of potential sites yield the majority of the potential grid benefits. As part of this study, New Power Technologies also evaluated the grid benefits of existing demand response projects, and found that though these projects were not originally targeted for grid benefits, a small share of the existing projects do nonetheless provide disproportionate grid benefits.

As the Energy Commission considers its recommendations, it should allow as an opportunity the ability to design programs to incent specific incent grid-beneficial distributed generation projects, where such programs can be supported by analytically-sound, objective analysis.

Conclusion

Incorporating grid benefits in an assessment of the cost-effectiveness of self-generation incentives is a worthwhile goal, and the Itron and TIAX/Rumla studies are important steps in that direction. Moreover, grid benefits of distributed generation are essentially entirely additive to customer benefits and environmental benefits – a potential project with an attractive customer or environmental benefit profile should be only more valuable to society if it also provides grid benefits. Likewise, a project with an attractive grid benefit profile can only more valuable if it also has strong environmental performance.

PIER-funded research has demonstrated that grid benefits of distributed generation can be objectively determined, and that differences in grid benefit contributions of individual projects are real and analytically supportable. Incorporating targeted grid benefits in self-generation incentives can yield benefits to non-participating ratepayers and society.

If you have any questions or require further information, please do not hesitate to contact me at 650.948.4546.

Sincerely,

Peter B. Evans